CONTAINER MANAGEMENT DURING DESERT SHIELD/STORM AN ANALYSIS AND CRITIQUE OF LESSONS LEARNED

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USAWC CLASS OF 1993

U.S. ARMY WAR COLLEGE, CARLISLE BARRACKS, PA 17013-5050

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION / AVAILABILITY OF REPORT APPROVED FOR PUBLIC RELEASE. DISTRIBUTION IS UNLIMITED.
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER(S)	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION U.S. ARMY WAR COLLEGE 6b. OFFICE SYMBOL (If applicable)	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (City, State, and ZIP Code) ROOT HALL, BUILDING 122 CARLISLE, PA 17013-5050	7b. ADDRESS (City, State, and ZIP Code)
8a. NAME OF FUNDING / SPONSORING ORGANIZATION 8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (City, State, and ZIP Code)	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. / PROJECT NO. / TASK NO. / WORK UNIT ACCESSION NO.

11. TITLE (Include Security Classification)

CONTAINER MANAGEMENT DURING DESERT SHIELD/STORM-- AN ANALYSIS AND CRITIQUE OF LESSONS LEARNED

12. PERSONAL AUTHOR(S)

LTC CLARK HALL AND LTC VINCENT BERNHARD

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
FINAL PROJECT	FROM _____ TO _____	930415	49

16. SUPPLEMENTARY NOTATION

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

The military lacks a viable method of determining container content using documentation alone. This inability to determine container content was demonstrated in the port of Dammam during Desert Shield/Storm. Of the 40,000 containers in the port, 25,000 required opening to determine their contents. In mid-1991, a working group convened to analyze a broad spectrum of distribution problems experienced during Desert Shield/Storm. Key among the lessons learned were the causes for the Army's inability to determine container content. However, the study also found that no single facet of logistics management could correct the shortcomings. In May 1992, the study group published their findings and proposed corrective actions as a Total Distribution Action Plan (TDAP). As a result of the peacetime experience of the authors, which included the deployment, sustainment, and redeployment phases of ODS, an analysis and critique of the TDAP was done. The analysis proposes an interface between commercial and military management information, logistics system integration, container content packaging innovations, better utilization of container ships, smaller/lighter deployable terminal management units, and a revamping of MILSTAMP. (OVER)

20. DISTRIBUTION / AVAILABILITY OF ABSTRACT ☐ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION
22a. NAME OF RESPONSIBLE INDIVIDUAL CHARLES D. MONTAGUE	22b. TELEPHONE (Include Area Code) 717-245-4797
22c. OFFICE SYMBOL AWCAA	

DD Form 1473, JUN 86 *Previous editions are obsolete.* SECURITY CLASSIFICATION OF THIS PAGE

CONTINUATION OF BLOCK 19:

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USAWC MILITARY STUDIES PROGRAM PAPER

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CONTAINER MANAGEMENT DURING DESERT SHIELD/STORM AN ANALYSIS AND CRITIQUE OF LESSONS LEARNED

A GROUP STUDY PROJECT

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15 April 1993

ABSTRACT

AUTHORS: Clark Hall, LTC., TC and Vincent Bernhard, LTC., TC

TITLE: Container Management During Desert Shield/Storm
An Analysis and Critique of Lessons Learned

FORMAT: Group Study Project

DATE: 15 April 1993 PAGES: 49 CLASSIFICATION: Unclassified

From the earliest days of ocean commerce until the early 1960s, the method of loading and accounting for cargo aboard ships changed very little--cargo was lifted aboard one piece at a time and manually documented. With the innovation of the shipping container, transportation efficiency vastly improved. Rapid loading and automated documentation were two of the reasons for the increased efficiency.

For a variety of reasons, the military has lagged behind the commercial transportation industry in the use of containers. As a result, the military lacks a viable method of determining container content using documentation alone. This inability to determine container content was demonstrated in the port of Dammam during Desert Shield/Storm. Of the 40,000 containers in the port, 25,000 required opening to determine their contents.

In mid-1991, a working group convened to analyze a broad spectrum of distribution problems experienced during Desert Shield/Storm. Key among the lessons learned were the causes for the Army's inability to determine container content. However, the study also found that no single facet of logistics management could correct the noted shortcomings. In May 1992, the study group published their findings and proposed corrective actions as a Total Distribution Action Plan (TDAP).

As a result of the peacetime experience of the authors, which included the deployment, sustainment, and redeployment phases of ODS, an analysis and critique of the TDAP was done. The analysis proposes an interface between commercial and military management information, logistics systems integration, container content packaging innovations, better utilization of container ships, smaller/lighter deployable terminal management units, and a revamping of MILSTAMP.

Containerization is the solution to the rapid projection of power and the movement of sustainment cargo to support any contingency response in a future regional conflict. Innovations in the use of the container ship and improvements to the efficiency with which containerized cargo moves from the factory to the foxhole will result in enhanced support to the warfighter.

INTRODUCTION

> The more I see of war, the more I realize how it all depends on administration....It takes little skill or imagination to see where you would like your army to be and when; it takes much knowledge and hard work to know where you can place your forces and whether you can maintain them there. A real knowledge of supply and movement factors must be the basis of every leader's plan; only then can he know how and when to take risks, and battles are won only by taking risks.[1]
>
> General Sir Archibald Wavell

Introduction of new technology has improved the efficiency with which wars have been fought throughout history. The appearance of gunpowder, the repeating rifle, airplanes, tanks, and other hardware directly increased the lethality of the battlefield over the past century and a quarter. Concurrently, the appearance of other non-lethal technology has made possible an even more efficient logistics support system with which to support the warfighter.

In the area of ocean transportation, for example, shipping goods directly to an overseas customer in a steel shipping container which is moved aboard a modern, high-speed vessel to the desired destination has become routine. Managing the entire process with automated systems is an integral part of modern transportation management.

Prior to the introduction of the steel container and automation, transportation management had changed little from the time international commerce began in the Mediterranean Sea nearly four thousand years ago. Back then, goods were lifted or carried aboard and lashed for security during the voyage. As each piece

was lifted aboard, a clerk would annotate the commodity with its stow location aboard the vessel. The ship's manifest was made from the clerk's record. After reaching its destination, the process was reversed. The quantity and condition of the items unloaded were verified using the manifest prior to delivery to the customer.

This process, though modernized somewhat over the centuries, was used until the appearance of containers and automation in the 1960s. This technology afforded unprecedented efficiency within the transportation industry resulting in wholesale change in the manner in which the products of international commerce moved to their destination.

As a global power, the military forces of the U.S. have always depended upon efficient movement of combat units and their sustainment to overseas location. This dependence has become even more important with the decrease in forward basing of troops and increased reliance on rapid reaction by contingency forces. Indeed, the ability to rapidly project land combat power to far-away places via sea may well determine the success of future wars. In the past, a shortfall in strategic mobility existed. Procurement of nineteen additional roll-on/roll off vessels will greatly enhance the rapid deployment of the combat vehicles of the Army's heavy divisions. The combat support and combat service support units will move, for the most part, by break-bulk ship. Virtually all sustainment, however, will move in containers via the commercial transportation network.

It is the movement and management of sustainment, as well as other "containerizable" cargo, which holds such promise for effective utilization of the steel container. During Operation Desert Shield, about 40,000 forty foot containers were delivered to the port of Dammam.[2] The contents of these containers supported over half a million soldiers, sailors, airmen, and Marines. Any future war will also rely heavily on the use of containers for sustainment.

The advantages offered through maximum use of containers is lost, however, if the contents inside are not known. Again, during Operation Desert Shield, the documentation portion of the equation was not sufficient to effectively manage port throughput. A terminal operator in the port of Dammam complained that "we received 40,000 seavan containers at the Port of Dammam and had to open 25,000 of them due to a lack of information on content and destination."[3] This failing was later identified by the Total Distribution Action Plan as one of the more severe deficiencies in the war.

This single downfall has sparked a new surge in the desire to solve a modern problem: "What's in the container?" During the days when cargo was transported on breakbulk ships, cargo could be identified merely by looking at it. With the advent of the container, identification of the cargo is not as easy. There are two ways to identify the contents of a container: Refer to the documentation or open the container door. Of course, the former is preferred, but accurate documentation is often not available.

This logistics shortfall should not come as a surprise to any logistician and should not be a great revelation as a systemic problem. Poor information on container content and destination has been a problem during peacetime since the advent of container use. Military ocean terminals at both stateside and overseas locations have been adversely affected. It has never surfaced to any significant degree during exercises such as Reforger or Team Spirit, but it has been a perennial problem in the day-to-day business of resupply and sustainment.

During a contingency operation, the need to know container contents and ultimate destination is vital. The warfighter has a legitimate need for information on the location of incoming deployment and sustainment cargo. Knowledge that several hundred containers of Class I are sitting in the port of debarkation does little good; in fact, the resultant port congestion exacerbates an already hectic operation in the port. In Desert Shield, it was this scenario that raised the container cargo visibility shortfall to the highest levels of the Army's logistics community.

Often, information on container contents and destination is asked of the transporter. Indeed, it falls upon the transporter to clear the port rapidly, because more cargo is on the way. However, even with accurate ocean cargo documentation, the cargo identification and destination may not be determinable. A need exists to enjoin all logistics players to find a solution to this shortfall. We must be able to load containers at origin, move

them to the port, transport them to the overseas port of debarkation, and finally move them to the ultimate customer at his location, all without opening the container.

Knowledge of container content is but one part of a desired improvement in the sustainment process. There are many reasons why container knowledge is generally unknown during the transportation cycle. Solving the transportation share of the problem is not possible without acknowledging that problems exist throughout the distribution cycle.

It is incontrovertible that a problem exists pertaining to effective and efficient movement of sustainment cargo from the originating source to the foxhole.[4] Awareness of the problem was heightened during the Persian Gulf War. The specific problems have been recognized and corrective action has been proposed through a Total Distribution Action Plan (TDAP). However, many of the proposed solutions have been rendered less feasible due to recent changes within DOD. In the opinion of the authors, the solutions to distribution problems related in TDAP require modification in order to avoid a recurrence during the next contingency operation.

OVERVIEW

The documentation of container content and container destination(s) has plagued logisticians since the inception of container usage in the sixties. However, the problems of the past need not be accepted in the future. The shortfall can be corrected by a combination of procedural changes and

implementation of available and soon-to-be-available automated systems. This paper will describe problems experienced in transportation management in the recent past, describe solutions proposed by the distribution community, assess the solutions and, where appropriate, propose alternative solutions.

The authors of this paper are former commanders of Military Traffic Management Command (MTMC) ocean terminals, one in Southern California, the other in Korea. Both were in command before, during, and after Desert Shield/Desert Storm and worked together effectively throughout their time in command. The California terminal was primarily involved in exporting cargo. The Korea terminal handled, for the most part, import cargo. Both terminals were heavily involved in deployment, sustainment, and redeployment during the recent Persian Gulf war.

In peacetime, over 75% of all cargo shipped from a military terminal is shipped in containers.[5] In general, if a piece of cargo will fit inside a container, it is moved by container. Only outsize pieces such as large vehicles move via breakbulk ships. It is a routine occurrence for CONUS ports to receive cargo at their container freight stations, then consolidate and load cargo into containers for a specific overseas destination. The cargo is documented, and the loaded container transferred to a commercial steamship company. The carrier then moves the container via their own ships for ultimate delivery to an overseas terminal. The cargo documentation is transmitted both electronically and in hard copy to the receiving port, or seaport

of debarkation (SPOD).[6] Ideally, the documentation is received at the SPOD several days before arrival of the ship. For a variety of reasons, this does not always occur.

Notification of containers arriving at the SPOD is received in a document known as the ocean cargo manifest. Built into the manifest is data which, among other things, identifies container contents and ultimate destination. The port operator uses the information to clear the cargo through the host country's customs procedures and also to arrange expeditious onward movement of the cargo to its final destination. Unfortunately, a shortfall anywhere within the documentation process disrupts the information flow. During the process of building the manifest, if any piece of the data required by the many automated systems is missing or in error, the manifest information is not created. When the manifest is not created, the usual result is arrival of a container without any supporting documentation. Tracing the accuracy of the manifest process is part of the normal quality assurance program within MTMC and is used as a measurement of the effectiveness of transportation management operations.

The inaccuracy of container documentation occurs for a variety of reasons and is caused by a variety of organizations, all of which will be discussed later in this paper. Since container documentation errors are commonplace during peacetime transportation operations, it is hardly surprising that the port of Dammam was inundated by undocumented containers during Operation Desert Shield. The problem has existed for years; the

sheer volume of wartime cargo identified the lack of container content and final destination information as a major shortcoming in transportation management.

The movement of cargo is a shared responsibility. For unit moves, responsibility is shared between the deploying unit and a transportation agency. For resupply or sustainment requirements, responsibility is shared between supply and transportation agencies, The basic problem is that, in each case, two different organizations are players in the business of moving an item from point A to point B. The problem is further compounded by where/who stuffs the cargo into a container and completes the required documentation. Figure 1 depicts three shipping, containerizing, and documentation scenarios. In each case, whoever containerizes the cargo must document it, and none of the activities share a common command and control. The accuracy of the documentation becomes a problem for the next activity down the line. All too often, the SPOD (the end of the line) is left "holding the bag."

In the scenario described above, in which one MTMC activity (California) ships to another (Korea), few problems exist. With common command and control, hardware/software, operating procedures, and strong interpersonal relationships among personnel, accuracy problems are less common. In all other shipping scenarios, however, this is not the case.

In the case of unit movements, the documentation process should be relatively simple. The unit makes a listing of what

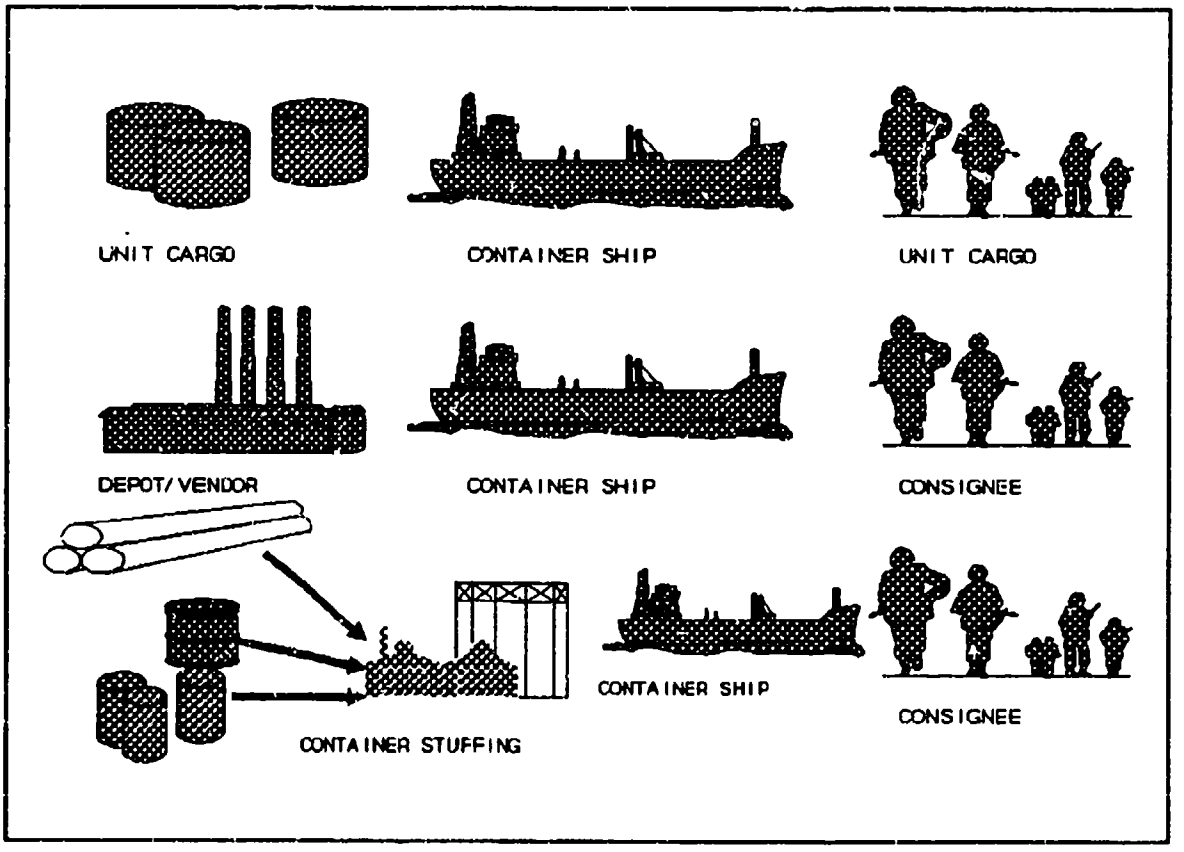

Figure 1. Shipping Scenarios

they stuff (load) into a container, records the container number, and retains the information on what was shipped. The container can then be moved forward in appropriate sequence upon the unit's arrival in the theater. The shipping process should be equally simple. The container should be tracked by the container number both by unit and the transportation agency throughout the movement phases until delivered to the ultimate destination.[7] During a contingency, equipment moved by container is often moved during a unit's initial deployment, and unit equipment containers move on the same ship as outsized equipment and vehicles. During Desert Shield, most unit commanders insisted on moving their unit

equipment containers with their other equipment. Most ships available for strategic deployment are capable of accommodating containers as well as RO/RO or breakbulk cargo.

The documentation process breaks down most often during the sustainment/resupply process. Sustainment/resupply cargo is documented at point of origin. That is, if containers are loaded at either a vendor or depot, that activity is also responsible for proper cargo documentation, thereby assuring the efficient transportation management at all stops along the way. Most supply activities have on-line capability with the military's transportation documentation system. In theory, source stuffed containers should have the same visibility as a container stuffed at a MTMC-controlled container freight station. When loaded containers depart the supply activity they are moved, by the steamship company, directly to a commercial port. The container is then loaded aboard a commercial vessel for eventual delivery to an overseas military ocean terminal. If documentation is incomplete or nonexistent, the overseas transportation manager receives no military manifest for arriving cargo.

Within the supply system, there is a data base known as the Logistics Information File (LIF). Maintenance of the LIF is the responsibility of the Logistics Control Agency (LCA). LCA is the Army's central source for supply and transportation information.[8] Through LIF, materiel managers are able to track the location of supplies and unit requisitions. This tracking process requires input from all the logistics nodes who interact with each

movement. The system is designed to tell the materiel manager the location of an item of supply, the identification of the container in which the item was loaded, and where it was containerized. It should also give the location of the item within the transportation pipeline, whether or not it arrived in theater, and if it has arrived at final destination. In order for this system to work, each node must input data via punch-card to update the LIF. When this fails, visibility is lost within that part of the logistics community.

When visibility is lost, as was the case in so many container deliveries during Desert Shield, there is a tendency on the part of the receiving activity to query the transportation manager for either status of the container, or to determine container contents. If no record of the cargo exists in the military's transportation documentation system, status cannot be given, causing frustration to both the supply manager and his transportation counterpart. Transportation documentation should not be the only source for container content. It is generally agreed that knowledge concerning container content is a valid logistics question, but not necessarily a question that can/should be answered by the transporter.

The success of Federal Express (FEDEX) is often used in discussions of intransit visibility of cargo. That FEDEX owns their entire movement network is frequently cited as the major difference between the commercial and military procedures. In reality FEDEX does not know (or care) what is in the box. For

example, if a customer orders six widgets from a widget manufacturer and FEDEX is chosen to deliver the widgets, FEDEX can, through use of their control number, determine when the box was picked up, where it is in their system, and when and to whom the box was delivered.

> The key to the system is an "air bill number" that is a ten digit tracking and tracing number in machine readable "bar-code" form. The number is a reference number by which to access package shipment data. The data collected feeds a central data base that provides Federal Express the ability to trace packages to specific pallets, containers, and transportation assets.[9]

However, FEDEX cannot tell if all six widgets were in the box, or if the box even contained widgets. FEDEX moves and tracks boxes, not widgets.

In this hypothetical example, if the customer receives the wrong widget or the incorrect number of widgets, the manufacturer is queried for status, not FEDEX. Similarly, if the receiving military supply activity has questions or problems concerning the contents of a source-stuffed container, the origin activity is responsible for resolution. The transportation documentation system, in its current form, is not well-suited to provide supply data.

DISTRIBUTION PROBLEMS

During the peacetime operations just prior to the Desert Shield deployment which began in August 1990, the authors became aware of shortcomings in the efficiency of cargo movement operations that were directly attributable to inadequate documentation for source-stuffed containers. Source-stuffed

containers are those that are loaded by a vendor or supply activity and are turned over to a carrier without being processed by a military ocean terminal. In this case, the shipper is responsible for cargo documentation.

On the SPOE (CONUS) side, containers were finding their way onto commercial ships with either no military documentation, or incorrectly prepared military documentation. Normally, the ocean terminal responsible for a specific geographic area prepares the military manifest for each sailing of a vessel based on input from two sources: Data from the terminal's own operations personnel, and data received from shippers who have source-stuffed containers for shipments on a specific vessel. Once prepared, this manifest is entered into MTMC's automated transportation system and transmitted electronically to the next higher headquarters and the SPOD. If shippers fail to document containers they ship, the carrier's data does not match the data of the terminal. In this case, the military manifest is incorrect.

The ocean carrier prepares a commercial manifest based on what was actually loaded aboard the vessel at the commercial port. Containers which arrive at commercial terminals without documentation often cause frustration on the part of the terminal operator:

> Containers often arrived without any advanced information. The ocean carriers would search frantically for any documents, including driver's paperwork, that would indicate where the container was to be shipped. Although labor intensive, the management of intransit information is as important as

the movement of the cargo itself.[10]

The documentation prepared by the carrier is maintained in a data base and is accessible by his agent at each of the ship's destinations.

Meanwhile, on the SPOD (Korea) side, the military terminal is responsible for customs clearance, cargo reconciliation, and onward movement of the cargo. All these arrangements are normally made while the ship is in transit, based on information received both from the CONUS terminal and the ocean carrier's agent. If the military and commercial manifests do not match, the error must be traced in order to determine the actual load.

Although lack of/incorrect shipper documentation has perennially been the primary source of documentation errors, other causes were experienced as well. The military manifest, transmitted via Defense Data Network (DDN), often was not received by the SPOD. The use of magnetic tape as a medium often failed because of the delicate nature of the automated system's hardware. For example, misalignment of the "read" heads at either the transmitting or receiving site, produced data that was undecipherable and unusable. Only after determination of which hardware was at fault could adjustments be made which finally permitted transmission of the military manifest.

Another cause of problems for the SPOD was the inability of the military manifest to manage the change necessitated by the carrier's decision to transship cargo. For efficiency, the carrier often transships, or discharges containers from the

original ship and loads them onto another ship for delivery at the ultimate destination.[11] When transshipment occurs, the military manifest is rendered incorrect and the SPOD must rely on other sources, normally the carrier's agent, to track the inbound cargo.

Before these systemic problems could be corrected, the Desert Shield deployment began. Many of the problems described above occurred during the rush to move sustainment to the desert in support of the Persian Gulf War. However, because of the magnitude of the Desert Shield operation, the earlier problems were dwarfed by comparison.

In order to assess the transportation problems encountered during the Desert Shield/Desert Storm period, it is vital to understand that the problems were not transportation specific, but were caused by a breakdown across the distribution spectrum. While logisticians worked diligently throughout the deployment, sustainment, and subsequent redeployment phases, their efforts were not sufficiently integrated to achieve satisfactory results. Therefore, the TOTAL DISTRIBUTION system required analysis, from factory to foxhole, in order to more efficiently support the modern battlefield of the future.[12]

In June 1991, the Army DCSLOG, responding to a tasking from the Vice Chief of Staff, Army, organized a Total Distribution Task Force to address the distribution problems identified in Desert Shield/Desert Storm. Combined Arms Support Command (CASCOM) and the Strategic Logistics Agency (SLA) took the lead

in order "to identify, analyze, and develop solutions to shortcomings associated with distribution."[13]

The task force grew to include participation by the entire Army CSS community, eventually totalling 85 agencies and organizations. The group analyzed some 265 issues from across the distribution spectrum.[14] These issues were grouped into five major categories: Containerization and Packaging, Distribution Management, Automation and Communication, Peace versus War Operations, and Intransit Visibility/Total Asset Visibility.

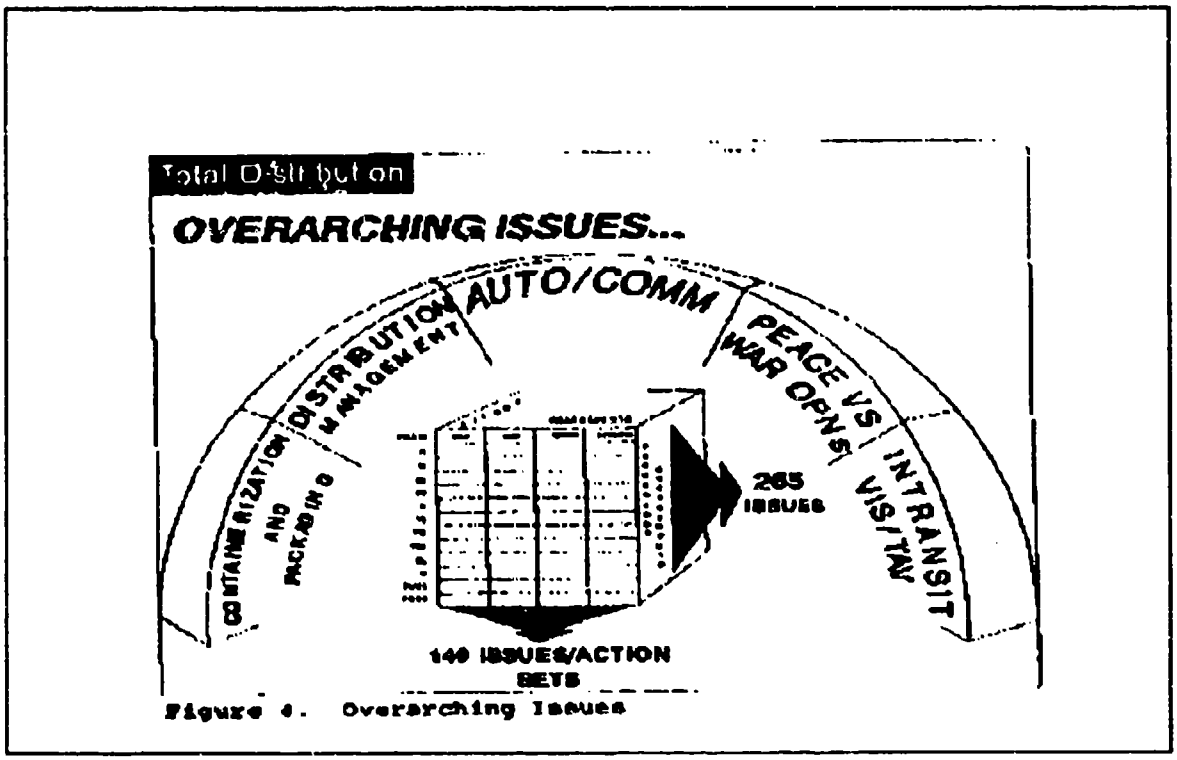

Figure 2. Total Distribution Issues

The final product of the task force was a Total Distribution Action Plan (TDAP), which was presented to the VCSA by the DCSLOG on 26 May 1992.

This paper will assess the five issues and the task force proposed solution for each. The authors found the development of the issues to be professional, but incomplete. The methodology of breaking the distribution system and its related problems into five categories simplified the overall assessment effort. The proposed solutions, while well thought out, require additional consideration, and in some cases, a different solution is proposed.

Containerization and Packaging Issues. The three major problem areas in dealing with containerization and packaging are packaging requirements in CONUS, throughput policy within the operating theater, and the requirement for more materiel handling equipment.[15] Each of these three issues affects the others within this category.

First, the strategic level supply system apparently has no contractual means to specify loading containers as "unitized" loads at vendors' warehouses. TDAP used Class I shipments as an example. When Desert Shield began, an in-theater Class I stockage requirement of 60 days was established.[16] Vendors were unable to meet this extraordinary demand and resorted to shipping large quantities of products in homogenous form. Entire forty foot containers arrived loaded with only one food type, e.g. lasagna. In order to permit utility, loads such as these

required unitizing upon arrival in theater. Often, the CSS units responsible for unitizing cargo were deployed late, causing some units to have little or no menu choice.

Containerization throughput policy and MHE policy were two other issues related to containerization and packaging. MHE was in short supply in many forward areas. It would have been desirable to move containers as far forward as possible in order to avoid double handling the cargo. In many cases the CSS units who should have handled and unloaded the containers at forward locations were deployed late, had insufficient MHE, or were not configured properly to accomplish the mission. Additionally, DOD policy is lacking concerning ownership of containers forward of the port and the proper procedures for returning the empty containers to the transportation pipeline.

As corrective action, TDAP recommended container cargo be unitized in CONUS. Failing that, the capability to unitize in theater was required. Regarding lack of MHE in forward areas was recommended that CSS unit deployments be synchronized with supported units. Doctrine and force structure should be modified to enhance the ability to handle and unload containers in remote areas of the theater. Finally, a DOD policy with regard to forward movement and ownership of containers is needed, according to TDAP.

Distribution Management issues. The Desert Shield experience identified three general distribution management issues: Task force organization, theater distribution plan, and

support relationships.[17]

When the employment phase began, units were task organized and arrayed against the threat. The units were responding to the commander's intent, in consonance with the factors of METT-T. Supporting CSS units, which were, in most cases, deployed later, faced difficulty locating their supported units in the widely dispersed theater.

Because of the rapid escalation of the deployment, there was insufficient time to prepare a theater distribution plan. Since the locations of the major tactical units within the theater were also unknown, the value of a theater distribution plan would have been limited in any case. For these and other reasons, a decision was made to ship cargo to Dammam in bulk, then organize the distribution plan from there. The inability to determine container content from cargo documentation necessitated the opening of 25,000 containers at the port prior to onward shipment. The backlog created in the port involved predominately Class I containers, but the enormity of the backlog subsequently affected every other class of supply.

During Desert Shield/Storm, movement control and materiel management assets were neither co-located nor did they share a common command and control. Communications and automation interface between these two functions should have been routine. This was not the case, to the detriment of overall distribution efficiency.

For corrective action, TDAP recommended the formation of a

Theater Distribution Management Center from the assets of the Movement Control Agency (MCA) and Material Management Centers (MMC). This consolidated and co-located organization, would serve as the focal point for CONUS and in-theater elements of the distribution network. Unit location (by DODAAC) and management of all support relationships would be managed by the same organization. The Theater Distribution Management Center would be the single agency capable of converting the CINC's logistics guidance into a theater distribution plan which links the sustainment pipeline from its origin in CONUS to the final destination.[18]

Automation/Communication Issues. The distribution problems that occurred as a direct result of inadequate automation or communications are the same problems that create the greatest challenge for total distribution management in the future. The communications capability and automated systems to enable efficient movement of materiel from the vendor to the foxhole are in need of major overhaul.

The Army's 29 automated systems have virtually no connectivity.[19] That means, for example, the supply documentation is not decipherable by systems in use by the transportation community. The automated systems currently used by transportation and supply use antiquated batch processing techniques. Timely status requests are not possible, frustrating the units that seek status of requisitions. Often, high-priority requisitions are intentionally duplicated to ensure ultimate

receipt of the materiel.

During the deployment, the Marine Corps noted shortcomings in their automated systems as well. In addition to not having CSS personnel in theater early to operate the systems, the systems did not interface with other Marine-unique logistics management systems.

> During the initial deployment, prepositioned equipment was not tracked well through the supply system and during distribution to arriving units. The Marine Corps attributes this to a lack of adequate automated logistics systems in theater early in the deployment. Due to the U.S. Central Command's requirement, the Marine Corps deployed its weapons systems before its automated inventory support systems. As a result, the ships in the first prepositioning squadron were unloaded without automated systems to track the flow of equipment and supplies.... The Marine Corps believes that improvements are needed to the automated information systems it uses for its maritime prepositioning force. According to a Marine Corps examination, some data redundancy existed, some interfaces had to be done manually, and the mainframe computer systems were more difficult to deploy than personal computers.[20]

As corrective action, TDAP recommends modernized hardware, capable of supporting a 5 1/3 division corps. Further, automated system connectivity should be enhanced by routing the information through Standard Army Management Information System (STAMIS) networks, which would then be transmitted through a gateway to the Defense Data Network (DDN). This communication link, the TDAP opines, should be "complemented with supporting strategic and tactical communications links to tie the system together."[21]

Peace Versus War Operations. Over the years, many vital logistics functions have been transferred in peacetime from logistics units to contracted service organizations. While the

operational costs have been reduced, efficiency has increased. Force structure has been reduced and/or transferred to the Reserve Component. As a result, the logistics units responsible for a particular function in wartime did not receive adequate opportunity to train for their wartime mission.

Another peacetime occurrence which detracted from wartime performance was strategic deployment. Historically, during JCS-sponsored or other type exercises of limited duration, deployment of maneuver units was emphasized. Only the bare essentials of CSS support were deployed. This created two sub-issues: The CSS units missed the training opportunity associated with practice deployments, and the importance of early movement of the CSS "slice" was not realized when the Desert Storm deployments began.

As corrective action, TDAP recommended that, where possible, supporting and supported units should establish the support relationship during peacetime in order to facilitate the transition to war.[22] Regarding CSS deployments, commanders at all levels should work to modify their Time Phased Force Deployment List (TPFDL) to ensure a proportional balance of CSS capability arrives in theater early enough to support the maneuver units. The past logic of "the first ships should contain nothing but combat units" sounds compelling. However, without ammunition, POL, transportation and Class I support to adequately provision and move the force, the maneuver units are of little value, other than to defend the port.

Intransit Visibility/Total Asset Visibility Issues. It is

the lack of intransit visibility (ITV) and total asset visibility (TAV) which caused most of the problems that were described in this paper's background section. Ideally, a requestor should be able to obtain supply and transportation status for each requisition within a reasonable period of time. Once materiel has been released by the supplier, a commander ought to have the ability to "find" the materiel within the system and divert it to another location, if necessary. To achieve this goal, container content information is required by the shipper, transporter, and receiver. This information was not available during Desert Shield.

During Desert Shield, shippers were overwhelmed by the necessity to get materiel into the theater. There was not enough time to properly unitize, document, load, and ship materiel, and still meet the needs of the combat units. It was believed better to ship the items in bulk quickly, knowing that the loads would require breakdown and reconfiguration upon arrival in theater. This led to the massive influx into theater of non-unitized Class I as well as thousands of tons of Class V with insufficient identification to permit onward movement quickly. The requirement to unitize thousands of containers of Class I in theater has previously been discussed. Class V ships sometimes arrived in theater with documentation no more specific than "Ammunition, Not Otherwise Specified." This meant that a portion of inbound ammunition ships required unloading before any assurance of ammunition type or quantity could be determined.

In order to correct these deficiencies, visibility must begin at the source, the shipper. The shipper requires an automation capability sufficient to satisfy not only the supply information requirements, but Military Standard Transportation and Movement Procedures (MILSTAMP) as well. Once this integration is made the receiver will have the capability to determine either supply or transportation status on expected materiel. Specifically, the receivers will have container content information, which will preclude the necessity to open the container to find out what is inside.

Technology and improved communication will play a role in implementation of ITV/TAV. Micro-circuit technology for logistics applications (MITLA) will permit easier tracking of containers in future scenarios. The Global Transportation Network (GTN) will enhance the ability of interconnectivity of the many supply and transportation automation systems. Finally, the Worldwide Port System (WPS), currently being fielded, is vital to future enhancements in cargo documentation.

TDAP CORRECTIVE ACTION ASSESSMENT

In this section the authors will critically examine the solutions proposed by the TDAP with regard to resources required, technology, force structure realignment, available communication capability, and overall workability. Many things have happened over the past year which impacts the viability of some of the solutions proposed by participants of the TDAP.

First, it is important to acknowledge that the products of

the TDAP are extremely valuable. That the issues are addressed in the context of total distribution properly focuses the solutions across the logistics spectrum. The following pages are less a critique of specific recommendations in the TDAP, but, rather, another view, more suggestions, and implementation of the reality of anticipated resource constraints as a result of a change of administration.

Second, not all aspects of the TDAP are assessed in this paper. Many legitimate issues which require resolution are in areas in which the authors lack expertise. Still other aspects lie in areas the authors consider beyond the scope of this paper. The analysis has been intentionally narrowed to include only surface transportation issues and selected issues which have a direct impact on surface transportation.

Containerization and Packaging Issues. To the extent possible, contractors, vendors, and depots should unitize container loads in CONUS, as was suggested in TDAP. Contractual language should be strengthened to so require unitization. In Desert Shield, the CINC required a 60 day reserve Class I stockpile in theater prior to commencement of hostilities. The war plans for all the geographical unified commands should be reviewed to determine whether or not the 60 day supply of Class I is a valid requirement or peculiar to Desert Storm. If a requirement, an increase to the stockage levels at the depots is required, because the industrial base is incapable of producing foodstuffs on short notice in quantities necessary to support a

500,000 man force against a credible adversary for 60 days.

TDAP suggested that a requirement exists to maintain the capability to unitize container loads for shipment to units located far from the port. While probably true, this capability should be available only as a last result. Again, if container loads are properly unitized in CONUS, many good things would result: Port container congestion would be reduced, onward movement arrangement for containers could be arranged in advance by port personnel, and the in-theater personnel who would unitize loads could be more effectively utilized in forward locations.

Insufficient materiel handling equipment (MHE) in the initial stages of the deployment was listed as a shortcoming. In addition to the recommendations made in TDAP, consideration should be given to deploy with each ship a small amount of MHE from support units to assist in port clearance, transloading, and unloading of containers. Small MHE could easily be containerized and moved with the early deploying maneuver units. MHE could be deckloaded on early departing container ships as these will most likely leave partially loaded.

The recommendation to amend doctrine and increase force structure to permit container handling far forward should be cautiously examined. While centralizing at the port was obviously a poor solution, there is also a point at which further container movement would also be undesirable. Rough Terrain Container Handlers (RTCH) are required for handling industry-standard forty foot containers. RTCHs are expensive to procure

and maintain, and are probably inappropriate for use forward of the division rear area.

A potential solution not addressed in TDAP was the use of containers other that MILVANs or commercial forty foot containers. For example, commercial side-opening containers, now being procured by the Army, are ideally suited for use in forward locations. These containers can be unloaded from the side using organic MHE, eliminating the requirement to download the container from the chassis. A side benefit of this method of container use is the rapid turnaround of the container. If containers are unloaded while on the chassis, the line haul trucker can return the empty container to the port for retrograde to CONUS for eventual reuse by a later-deploying unit. Additionally, container detention charges stop when the commercial container is returned to the ocean carrier.

Use of wood crates for shipping containers should also be explored. Crates similar to those currently used for the shipment of household goods could easily be prefabricated by units prior to deployment. Although not as sturdy, many of the advantages offered by use of steel containers are possible. Upon arrival at the port, the crates could be moved forward by organic vehicles, the supporting transportation unit, or host nation line haul support. A final benefit of the wooden container is the utility to the deploying unit after its contents are emptied, e.g. storage, shelter, temporary offices.

Distribution Management Issues. The authors cautiously

agree with the corrective actions recommended by TDAP. In particular, consolidating and co-locating materiel management and movement control functions under the command and control of an omnibus Theater Distribution Management Center is an outstanding solution to a serious theater distribution shortcoming. However, the doctrinal implications require close scrutiny. For example, command and support relations among the various command and staff elements, particularly the J-4 and the Support Command commander, require specificity.

Automation/Communication Issues. The authors have substantial disagreement with the recommended solutions to the problems experienced as a result of automation and/or communication. This disagreement is based on availability of budget resources to fund modernized equipment, failure to address competing uses for finite communication nodes, and failure to consider interim solutions until modernized equipment is available.

Because of budget realities, many of the solutions offered by TDAP in the area of automation and communication are no longer relevant. While it is true that the new systems and communication capabilities either being procured or under development by the Army will eventually solve many of the related problems identified by TDAP, it is fallacious to assume this course of action is still viable. In addition to the $60 billion cut to the DOD budget proposed in late 1992, an additional $10.8 billion cut was mandated by Secretary of Defense Les Aspin in

February 1993. The Army's share of the cut was $2.5 billion.[23]

Two significant automation/communications improvements serve as examples of the vulnerability of improvements anticipated by TDAP. The development of an automated interface between the tactical data network and the Defense Data Network (DDN) requires funding of $68.5 million through FY 98.[24] The development and procurement costs were unfunded before the latest mandated funding cut. Needed improvements for communications interfaces for CSS automation devices anticipates funding of $87.9 million through FY 95. About $46 million of this total was unfunded before the latest budget cut. The chances of either of these programs being fielded within the timeframe stated in the TDAP is probably very slim. Description of this sub-issue is not intended as criticism of the TDAP process or the study participants; the budget cuts had not been announced at the time the study was released.

Logisticians generally accept that their access to finite communication assets are of lower priority than the maneuver units. During the battle, every possible communications channel is dedicated to the support of that battle, as it should be. In the event of a lengthy combat operation, access to communications assets for logistics applications will likely be delayed. Logisticians must pursue an alternative, reliable communications capability in the event "shared" assets impede the logistics communications flow. If the host nation infrastructure permits, commercial telephone link, coupled by modem to microcomputer is

perhaps the best means of data transfer.

From a parochial transportation view, the Worldwide Port System (WPS), currently being fielded, offers a vital near-term, as well as long-term solution to many of transportation's communications/automation shortcomings. It has thus far been unaffected by any budget cuts. The authors concur with TDAP that the future efficiency of surface transportation documentation relies heavily on continued fielding of WPS at all common user ports.

Finally, in an issue that is related to the previous two, the authors believe the participants of the TDAP study gave inadequate consideration to the development of interim solutions while new, compatible systems are being fielded. If a contingency developed tomorrow, the distribution community would be facing virtually the same challenges that were evident in late 1990. Although some issues provided interim "workaround" solutions, many of these solutions relied on "shared" communications, as previously discussed. Other issues had no proposed interim solutions, but were waiting for developmental programs to solve the problem. Interim solutions are required for all TDAP proposals in order to prevent the possibility of a recurrence of those problems witnessed during Desert Shield.

Peace Versus War Issues. The proposed solutions to the problems identified in the peace versus war category were generally good. One sub-issue, however, warrants additional comment. The use of exercises, particularly large, JCS-sponsored

exercises traditionally do not adequately utilize the talents of the distribution community. Because of political and budgetary considerations, these exercises are planned a year in advance, in excruciating detail, and with little room for originality. To obtain maximum training benefit, all players, including logisticians, must be given the opportunity to practice in peacetime the things they will be required to do during war. Political considerations and budgetary constraints, while important and understandable, must be tempered with realism to the extent possible.

For example, Team Spirit, a JCS-sponsored exercise using a Korean scenario, is planned and executed by PACOM annually. The level of planning detail eliminates much of the realism which would occur during an actual contingency. Deploying units are identified months in advance. SPOEs are identified, ship pre-stow plans are developed, stevedoring contracts are awarded, and supporting personnel are pre-positioned well in advance of the exercise commencement. Due to the short duration of the exercise, most sustainment operations are notional; Class I is provided from theater stocks, intratheater transportation is pre-planned, ammunition, water, medical, and most other CSS functions are conducted at minimal levels. While the training value to maneuver units is excellent, CSS play is limited.

Both authors participated in Team Spirit exercises prior to Operation Desert Shield. Team Spirit deployments in no way resembled the Desert Storm deployment! To infuse more meaningful

training into the exercise, PACOM should:

a. For 25% of participating units, alert notification should occur "no-notice".

b. SPOE should not be identified until C-Day.

c. MTMC/Military Sealift Command should negotiate a special container agreement with a commercial carrier.

d. An ammunition shipment (containerized) should be included as part of the sustainment package.

e. Containerized Class I should be planned and executed to at least replenish in-country stocks.

f. All automated CSS functions should be accomplished per wartime doctrine.

Understandably, some of the above functions might require administrative "tweaking", but the overall training value to the units must be maximized.

Intransit Visability/Total Asset Visability Issues. It could easily be argued that the most difficult, yet most important total distribution issues concern intransit and total asset visibility. The cycle which caused the lack of intransit visibility discussed earlier began at the CONUS depot/vendor. This lack of visibility helped create the congestion at the port of Dammam. Effective materiel management and movement control was hampered by the lack of intransit visibility. Intransit visibility contributed to a lack of confidence in the supply system. The TDAP study group proposed several appropriate solutions, but could have provided more.

At the beginning of the sustainment cycle, visibility over the cargo must be established. This cycle, initiated by the shipper, is vital to the transporter. Intransit visibility is not possible without input from the shipper. Transportation personnel use the MILSTAMP data initiated by the shipper at modal changes throughout the transportation pipeline to monitor the progress and keep the cargo moving. Supply personnel use data initiated by the shipper to provide status to the originating activity and avoid duplicative requisitions. The need for accurate, timely documentation from the shipper cannot be overemphasized. Training in supply and transportation documentation procedures should be initiated for every depot/vendor within DOD. Refresher training should be conducted periodically. Liaison visits from supply and transportation activities should begin in peacetime and continue through any future contingency. In the event of automation/communication inadequacies, an alternative manual system of telephone and facsimile transmission must be in place. Failure of the shipper to provide needed transportation and supply data is unacceptable.

Military Standard Transportation and Movement Procedures (MILSTAMP) are outdated:

> Using codes or generic descriptions as prescribed in MILSTAMP only serves to confuse anyone without thorough knowledge of MILSTAMP. Commercial shippers have solved this problem by using plain English descriptions of cargo for daily shipments.[25]

Developed in the 1960s, MILSTAMP was written to be usable with the automation technology of the day, including 80 column punch

cards, commodity codes, and multi-part paper Transportation Control Movement Documents (TCMD). Technology has improved faster than MILSTAMP has been improved. Punch cards are no longer used, commodity codes are confusing and unnecessary with modern computers, and paperless TCMDs are now possible. The time has come for a major revision to MILSTAMP.

Over the years, ocean carriers have developed ultra-modern transportation documentation procedures which permit accurate tracking of cargo moving within their system. During the Desert Sortie (redeployment) operation, MTMC cargo specialists accessed the carriers' data bases and successfully traced hundreds of misrouted containers. In Korea, the carrier often provided inbound container status faster and with greater accuracy than the military's own cargo tracking system. In fact, through an informal arrangement between the MTMC terminal and the carrier, inbound information, customs clearance, and onward movement arrangements were coordinated effectively using the carrier's automated system exclusively.[26] One of the large ocean carriers has recently expressed an interest in pursuing a similar, but more formal arrangement with its military counterparts throughout the western United States and its Pacific ports of call.[27] The possibility of using the automated cargo tracking system of commercial carriers in lieu of the current military system should be further explored.

OTHER VIEWS

Four issues are discussed below that, in the opinion of the

authors, should be considered by various elements of the CSS community. One of these issues was discussed above; its inclusion here serves to add emphasis to what we perceive to be a systemic shortcoming regarding strategic deployment. Of the remaining three, two were briefly discussed in TDAP. The remaining issue was not addressed in TDAP, but should be added. Corrective action taken by the appropriate CSS activity should also be included.

Late Deployment Of CSS Units. If there is a common thread in the five overarching issues identified by TDAP, it is this: Had CSS troops been deployed to the theater earlier, the American forces would have been combat ready earlier than actually occurred. Late deployment of CSS personnel was a problem not unique to the Army. The discharge of the Marine Preposition Ships at the port of Jubayl was delayed due to the late arrival of personnel designated to accomplish ship offload.

> The Marine Corps' ships were unloaded inefficiently early in the deployment because combat service support personnel were not yet in theater and confusion existed on proper procedures. As a result, the equipment from the first of the ships to arrive was issued without an organized staging plan, which caused some delays.[28]

Planners at each regional unified command should make the necessary TPFDL changes to ensure a more balanced maneuver/support force deploys in conjunction with the first ships.

Handling of cargo in the port was hampered initially by the lack of CSS units. There was an inability to unitize container loads initially because the responsible CSS assets, personnel and

equipment, had not arrived in theater. Onward movement of cargo from the port was also slowed because the Department of the Army Standard Ports System - Enhanced (DASPS-E) equipment was deployed late. The ability to work containers forward of the port was not possible early in the deployment because RTCHs (container handlers) had not yet been deployed. Early in the deployment, information management at both the materiel management center and the movement control agency was degraded because the trained personnel had not yet arrived. No one would suggest moving CSS early at the expense of combat power, but deployment of a force properly balanced with adequate CSS (troops and equipment) actually enhances combat effectiveness.

Containerization of Ammunition. Of the nearly 400,000 tons of ammunition moved during Desert Shield, very little was moved via container. Ammunition was moved via break bulk ship, an inefficient method of ammunition transport. In any future contingency, we must have the ability to move great amounts of ammunition quickly. Rapid movement of ammunition is possible only if containers are used.

The best way to illustrate the advantage of shipping ammunition via container vice breakbulk is to describe ammunition movement via breakbulk ship. Step one, line the holds of the ship with lumber, a process known as "sheathing." Sheathing takes one to two weeks to accomplish. Step two, load the ammunition onto the ship, one pallet at a time, documenting each pallet. Loading takes three to four weeks. Step three, sail the

ship to the SPOD. Step four, unload the ship, documenting each pallet as it is discharged. A ship can be offloaded in less time than it takes to load, about two to three weeks. This process was repeated about fifty times to get the ammunition to the theater and slightly fewer times to bring back the residual after the war. By contrast, a ship can load or discharge 500 Containerized Ammunition Distribution System (CADS) containers in two to three days. In future contingencies, we may not have the luxury of time to build a theater ammunition inventory. We must convert our present ammunition distribution doctrine from reliance on breakbulk shipment to the efficiency offered by containers.

Containers were not used during Desert Shield because of CONUS infrastructure limitations and the inability to handle containerized ammunition in theater. Early in the deployment, AMCCOM determined that packaging and movement of ammunition via container was not advisable. The ammunition depots did not have the capability to prepare shipments in sufficient quantity to allow efficient container transportation. Class V distribution in theater suffered for a variety of reasons. Class V problems, all clearly addressed in TDAP, included lack of automation, lack of ammunition handling personnel, and lack of handling equipment in the forward areas. When these problems were added to the problems being experienced with containers in the port of Damman, transport of Class V via breakbulk was requested by theater logisticians.

The distribution community must alter their doctrine to enable realization of the benefits associated with containerized ammunition. The AMCCOM depots must devise some method that will enable massive containerized shipments early in the deployment cycle. Ammunition storage in CADS is one possibility which would enable rapid shipments early in a contingency. In the theater, arrangements should be in place early to offload, transport, and distribute containerized ammunition. The TPFDL adjustments to support efficient ammunition distribution requires maneuver unit tradeoffs, but the resultant combat enhancements offered by an adequate ammunition distribution capability would be a net plus.

The CONUS port infrastructure is ideally suited for the movement of containerized ammunition. Military Ocean Terminal Sunny Point, MTMC's east coast ammunition port, routinely handles containerized ammunition shipments to and from Europe. Concord, California, currently a Navy-operated ammunition port, is projected to have container capability by FY 94.[29]

Command and Control, 7th Transportation Group. MTMC has responsibility for the operation of common user water terminals worldwide. During Desert Shield, 7th Transportation Group, who opened and operated the port of Dammam, came under the command and control of 22nd Support Command. MTMC personnel were introduced to the theater after a few weeks and worked with 7th Group until taking over all port operations about half way through the redeployment. Some of the shortcomings associated with common user water terminal operations can be attributed to

ambiguity resulting from not having clearly defined organizational responsibilities.

TDAP addressed common user water terminal shortcomings. Among the corrective actions proposed to correct the shortcomings was the suggestion that the terminal service and stevedoring units of 7th Group come under MTMC during contingency and wartime situations.[30] For the sake of unity of command and effort, this recommendation makes sense. Coordination among MTMC, FORSCOM, JCS, USTRANSCOM, and the geographical unified commands should proceed to establish the appropriate command arrangements as doctrine.

Retrograde Operations. TDAP did not address any of the problems associated with the redeployment (Desert Sortie). There were enough separate learning experiences to warrant their inclusion in TDAP. Problems included improper packing, improper or nonexistent documentation, incorrect routing, pilferage of sensitive items, shipment of unauthorized war trophies, and numerous safety-related incidents.

Many of the problems associated with the deployment can be traced to the emphasis placed on early return of the troops. Shortly after the ground war ended, units began the massive task of redeployment to CONUS and Europe.

> Over 100,000 wheeled vehicles, 10,000 tracked vehicles, and 250,000 tons of ammunition were left in the desert. Nearly 50,000 truckloads were needed to move the massive quantity of retrograde materiel to the ports and 400 shiploads to return it to the United States.[31]

Instead of taking the time and manpower to properly pack, load,

and document their equipment, many units left small "stay-behind" detachments to accomplish these vital functions. The Government Accounting Office took a particularly dim view of the manner in which units prepared for the redeployment:

> During redeployment, many units did not inventory their materiel before packing it and did not prepare the documents necessary to identify container contents or efficiently move the containers back to the United States.[32]

Equipment was often improperly packed, causing damage enroute. Some units experienced pilferage of such sensitive items as night vision goggles, while others shipped unauthorized war trophies with their normal impedimenta.[33] Improperly documented containers created tracking and accountability shortfalls. On some occasions, the container numbers were not recorded. Typically, units would request MTMC assistance in tracing containers that were one month overdue. MTMC was able to track hundreds of misrouted containers through the ocean carriers' automated systems, provided the container number was known. On those occasions when container numbers were not known, MTMC had less success in tracking down the missing containers.

> Retrograde container identification became a problem when one of two things happened - units did not know the number of the container they loaded, or they shipped their equipment in unnumbered MILVANs.[34]

The inability to recover its redeployed equipment not only created an accountability nightmare, but adversely affected the unit's combat readiness as well.

Several safety incidents can be traced to the rapid redeployment of units. Containers were loaded with incompatible

hazardous material. Unauthorized items, such as captured enemy weapons were shipped. An Air Force shipment containing "empty" missile crates had been inadequately checked and contained 66 AGM-65 Maverick missiles. Fortunately, no accidents occurred as a result of improperly packed equipment.

A separate study of the shortcomings associated with the hasty redeployment is warranted. Commanders at all levels must be made aware of the need to redeploy in an orderly fashion, so the possible ramifications if a Desert Sortie-type redeployment are not repeated.

CONCLUSIONS

The Tampa Bay of 1898 that James Huston described in his Sinews of War sounds very much like Dammam 92 years later:

> The railroads serving the Tampa area soon were clogged with freight cars... and many cars arrived without invoices or bills of lading, so their contents could be determined only by personal inspection.[35]

There are many shortcomings associated with distribution of sustainment cargo on the modern battlefield. During Desert Storm, many lessons were learned that, if properly applied, will improve distribution of the sustainment needs of the warfighter.

Supply, transportation, automation, communication, and training systems and personnel are the key to enhanced distribution in the future. While the background focus of the authors has always been transportation, it is important to realize that transportation is inextricably linked with the other components which play a part in effective distribution of sustainment materiel.

The Total Distribution Action Plan (TDAP) assessed a series of distribution problems, identifying five overarching issues: Containerization and Packaging, Distribution Management, Automation and Communications, Peace versus War Operations, and Intransit and Total Asset Visibility. The participants of this study identified sub-issues related to each of the overarching issues. Thoughtful solutions were proposed for each identified sub-issue.

More emphasis on unitizing container loads in CONUS, a stated throughput policy, and additional materiel handling equipment were recommendations associated with containerization and packaging issues. Consolidation of the Materiel Management Center and Movement Control Agency, earlier preparation of the theater distribution plan, and earlier establishment of support relationships were proposed as distribution management solutions. Modernized hardware, interoperable systems, and a dedicated logistics data link were all proposals to remedy automation and communications shortfalls. TPFDL preparation based on the factors of METT-T, battle rostering of combat service support individuals, and more training opportunities for support troops are examples of peacetime operations enhancing eventual combat operations. Better source data, improvement and enforcement of MILSTAMP, and incorporation of new technology to enable container content information are the three proposals to address the problems of poor intransit and total asset visibility.

The solutions in TDAP, while excellent, need amendments.

The recent budget cuts will have an adverse impact on developmental programs aimed at improving total distribution shortcomings. Technology developments, in particular, will be delayed. Force structure reductions will probably eliminate the possibility of increasing manpower to accomplish vital CSS functions. Finite communications assets will be prioritized to permit combat-related message traffic before logistics traffic, delaying important logistics functions. Many improvements to the distribution system are possible by implementing inventive interim solutions to problems awaiting long-term solutions.

CSS units, traditionally deployed after maneuver units, should be deployed in support "slices" to provide a more balanced force capable of a more rapid combat readiness upon arrival in theater. In the future, ammunition must move via containers to be available should the combat forces have to fight soon after their arrival in theater. During contingency or wartime situations, the terminal service and stevedoring units of the 7th Transportation Group should come under the command and control of MTMC. Finally, all future retrograde operations should be carefully planned and executed to return the redeploying units to a combat ready status as soon as possible.

The various disciplines that constitute the total distribution community should work together to understand the workings of all aspects of the sustainment cycle. Each activity exists for a common goal: To provide the best possible support to the warfighter. The cycle starts in a CONUS factory and does

not end until the item reaches the soldier's foxhole in the theater. Every member in each step along the way has an important role to perform to properly support the warfighter. Logisticians throughout the cycle should accept the challenge to propose improvements in the process for the benefit of us all.

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